

## BAB VII

### PERHITUNGAN SAMBUNGAN BALOK B4 DENGAN KOLOM K

#### 7.1 Sambungan Balok B4 dengan Kolom K

##### Output Gaya Maksimum pada Sambungan hasil ETABS

$M_u := 14161.82 \text{ kgm}$

$P_u := 7468.13 \text{ kg}$

Direncanakan baut HTB  $\phi 16$  BJ 41

$f_{ub} := 4100 \text{ kg/cm}^2$

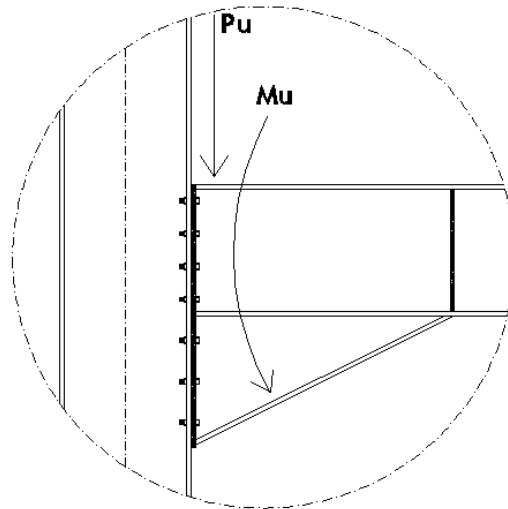
$\Phi_{\text{baut}} := 16 \text{ mm}$

$A_b := \frac{\pi}{4} \cdot 1.6^2 = 2.011 \text{ cm}^2$

Pelat penyambung BJ 37

$f_u := 3700 \text{ kg/cm}^2 \quad t_p := 10 \text{ mm}$

$f_y := 2400 \text{ kg/cm}^2$



- Kontrol Geser

Direncanakan baut HTB 14  $\phi 16$

$V_u := \frac{P_u}{14} = 533.438 \text{ kg}$

$f_{uv} := \frac{V_u}{A_b} = 265.31 \text{ kg/cm}^2 \quad \blacksquare \leq \blacksquare \quad 0.5 \cdot 0.75 \cdot f_{ub} \cdot 1 = 1537.5 \text{ kg/cm}^2 \quad \text{OK!!}$

- Beban Tarik ( interaksi geser dan tarik )

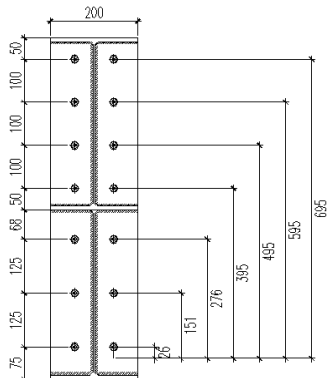
$f_t := (1.3 \cdot f_{ub} - 1.0 \cdot f_{uv}) = 5064.69 \text{ kg/cm}^2 \quad \blacksquare \geq \blacksquare \quad f_{ub} = 4100 \text{ kg/cm}^2$

$f_t := f_{ub} = 4100 \text{ kg/cm}^2$

$T_d := 0.75 \cdot f_{ub} \cdot A_b = 6182.654 \text{ kg}$

Mencari garis netral ----> anggap dibawah baut terbawah

$a := \frac{14 \cdot T_d}{20 \cdot 2400} = 1.8 \text{ cm} \quad \blacksquare \leq \blacksquare \quad 7.5 \text{ cm} \quad \text{OK!!}$



Momen rencana yang dapat dipikul sambungan

$$\Phi M_n := \frac{\left[ \left( 0.9 \cdot 2400 \cdot a^2 \cdot \frac{20}{2} \right) + 2 \cdot T_d \cdot (2.6 + 15.1 + 27.6 + 39.5 + 49.5 + 59.5 + 69.5) \right]}{100} = 33260.246 \quad \text{kgm}$$

$$\Phi M_n = 33260.246 \quad \text{kgm} \quad \blacksquare \geq \blacksquare \quad M_u = 14161.82 \quad \text{kgm}$$

- **Sambungan Pelat dengan Balok ( Sambungan Las )**

Digunakan las  $F_{E70XX}$

Tebal las  $t_e := 1 \quad \text{cm}$

Profil balok B4 WF 400 x 200 x 8 x 13 BJ 37

$$h := 400 - 2 \cdot (13 + 16) = 342 \quad \text{mm}$$

$$\text{Alas} := 2 \cdot (34.2 + 20) \cdot 1 = 108.4 \quad \text{cm}^2$$

$$I_p := 2 \cdot \left[ \left( \frac{1}{12} \cdot 34.2^3 \right) + \left[ 1 \cdot 108.4 \cdot \left( \frac{40}{2} \right)^2 \right] \right] = 93386.948 \quad \text{cm}^4$$

**Akibat beban geser sentris**

$$P_u = 7468.13 \quad \text{kg}$$

$$f_u := \frac{P_u}{\text{Alas}} = 68.894 \quad \text{kg/cm}^2$$

**Akibat beban momen lentur**

$$M_u = 14161.82 \quad \text{kgm}$$

$$S_x := \frac{I_p}{20} = 4669.347 \quad \text{cm}^3$$

$$f_h := \frac{M_u \cdot 100}{S_x} = 303.293 \quad \frac{\text{kg}}{\text{cm}^2}$$

$$f_{\text{tot}} := \sqrt{f_u^2 + f_h^2} = 311.02 \quad \frac{\text{kg}}{\text{cm}^2}$$

**Kekuatan rencana las**

$$\Phi f_n := (0.75 \cdot 0.6 \cdot 70 \cdot 70.3) = 2214.45 \quad \frac{\text{kg}}{\text{cm}^2}$$

$$f_{\text{total}} < \Phi f_n$$

$$\text{teperlu} \geq \frac{f_{\text{tot}}}{\Phi f_n} = 0.33 \quad \text{cm}$$

$$\text{aperlu} \geq \frac{0.33}{0.707} = 0.467 \quad \text{cm}$$

Syarat :

$$a_{\text{min}} := 5 \quad \text{mm} \quad (t = 12 \text{ mm})$$

$$a_{effmax} := 0.707 \cdot \frac{3700 \cdot 0.8}{70 \cdot 70.3} = 0.425 \text{ cm (las di badan)}$$

$$a_{effmax} := 1.41 \cdot \frac{3700 \cdot 1.3}{70 \cdot 70.3} = 1.378 \text{ cm (las di daun)}$$

maka dipakai  $a = 5 \text{ mm} > a_{perlu} = 4.67 \text{ mm}$

- **Kontrol Pelat Sambung**

Pelat penyambung BJ 37

Direncanakan baut BJ 41

$$f_u := 3700 \text{ kg/cm}^2$$

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$f_y := 2400 \text{ kg/cm}^2$$

$$d_b := 1.6 \text{ cm}$$

$$t_p := 1 \text{ cm}$$

$$A_b := \frac{\pi}{4} \cdot 1.6^2 = 2.011 \text{ cm}^2$$

**Luas bidang geser**

$$L := 80 \text{ cm}$$

$$A_{nv} := (L - 7 \cdot d_b) \cdot t_p = 68.8 \text{ cm}^2$$

**Kuat Rencana**

$$\Phi P_n := 0.75 \cdot (0.6 \cdot f_u \cdot A_{nv}) = 114552 \text{ kg} \quad \blacksquare > \blacksquare \quad P_u = 7468.13 \text{ kg}$$